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Vacuum cleaner with filter drawer

The invention relates to a vacuum cleaner according to the introductory part of patent claim 1.

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A vacuum cleaner according to category is known from DE 36 33 783 A1, which has a drawer-shaped housing part withdrawable from a second housing part. The drawer-shaped housing part contains a dust bag and accessories, as well as a motor chamber disposed therebehind. The drawer-shaped housing part containing the dust chamber and the motor
10 chamber can be withdrawn from the other housing part like a drawer from a cupboard. A mechanical abutment is provided so that the motor chamber when the drawer-shaped housing part is withdrawn still remains completely covered by the upper side of the second housing part. Assembly of the vacuum cleaner shall be simplified by this construction. After installation of the components, which are to be received in the vacuum cleaner, in the
15 drawer-like housing part pushing thereof into the second housing part is merely necessary in order to complete assembly of the vacuum cleaner.

In that case, however, it is disadvantageous that removal of the dust bag is possible only in a manner which is awkward for the user. On the one hand, the drawer-shaped housing part
20 containing the dust bag is withdrawable only with expenditure of a high degree of force, since the heaviest component of the vacuum cleaner, namely the motor/fan unit, has to be withdrawn at the same time, and on the other hand the dust bag filled with dust has to be gripped in order to be able to remove it from the vacuum cleaner.

25 It is the object of the invention to develop a vacuum cleaner according to category with a drawer-like pull-out in such a manner that a dust separator is removable from the vacuum cleaner in a simple manner or a manner convenient for the user.

According to the invention this object is fulfilled in that the motor/fan unit is fixedly arranged in the housing and the dust separator is removable from the flow path of suction air by withdrawal of the drawer-like pull-out.

5 Inasmuch as the motor/fan unit is fastened to the stationary housing part of the vacuum cleaner, the motor/fan unit does not have to be moved at the same time on withdrawal of the drawer-like pull-out. The drawer-like pull-out can accordingly be withdrawn with little expenditure of force. Since the dust separator is removed from suction air by withdrawal of the drawer-like pull-out from the flow path, an inconvenient manual detaching of the dust
10 separator from the flow path is eliminated. In order to remove the dust separator from the flow path, the dust separator no longer has to be directly gripped by the user, but it is sufficient to merely grip the drawer-like pull-out.

In a preferred embodiment of the invention the connecting stub pipe for the suction hose or
15 the suction pipe is fastened to the housing and the dust separator connected with the connecting stub pipe by way of the drawer-like pull-out. It may be possible in principle to provide the connecting stub pipe at a wall of the drawer-like pull-out. Thus, the suction hose or suction pipe connected with the connecting stub pipe is moved together with the drawer-like pull-out and the connection between suction hose and dust separator is
20 maintained. This has the advantage that there is no risk of leakage losses due to a non-tight connection between suction hose and dust separator. On the other hand, a fixed coupling of the connecting stub pipe to the drawer-like pull-out is disadvantageous with respect to mobility and a possible removability of the drawer-like pull-out. If, however, the connecting stub pipe is fastened to the housing and the dust separator is connectible with
25 the connecting stub pipe by way of the drawer-like pull-out then a suction hose connected with the connecting stub pipe or a connected suction pipe does not have a disadvantageous effect on the movability of the drawer-like pull-out. The pull-out can be pulled out and pushed in without having to move the connecting stub pipe therewith. Thus, possible braking forces introduced into the connecting stub pipe by a connected suction hose or a

suction pipe are not transmitted to the drawer-like pull-out. The drawer-like pull-out remains easily movable with little expenditure of force.

In a developed construction the drawer-like pull-out carries a coupling member which can be flowed through by suction air and which in a closed position of the drawer-like pull-out of the dust separator is connected with the connecting stub pipe. The coupling member is firmly attached to the drawer-like pull-out. The dust separator, which can, for example, be constructed as a dust filter bag or as a cyclonic separator, is held at the coupling member at least approximately in hermetically sealed manner. For this purpose an inlet opening at the dust filter bag or at the cyclonic separator can have an encircling seal which bears against a tubular stub pipe of the coupling member. A further tubular stub pipe can be formed at the coupling member at a side of the coupling member remote from the dust separator and can also have a seal, which in a pushed-in position at the drawer-like pull-out bears in at least approximately hermetically sealed manner against the connecting stub pipe, which is attached to the housing, for the suction hose or for the suction tube. The coupling member can also have a centring element which engages in a corresponding guide element at an inner wall of the housing. It is thus ensured that the coupling member and therewith also the dust separator bear against the connecting stub pipe in accordance with operation when the drawer-like pull-out is in the pushed-in operating position. The centring element does not have to be directly formed at the coupling member, but can also be arranged at another suitable position of the drawer-like pull-out. A hermetic connection of dust separator and suction hose or suction pipe can be achieved in reliable manner by means of the coupling member.

In an advantageous variant the drawer-like pull-out is displaceably mounted in the housing in a plane inclined relative to the horizontal. This has the advantage that pushing-in of the withdrawn drawer-like pull-out is assisted by gravitational force. In a particularly suitable construction the drawer-like pull-out is mounted for easy motion in the housing of the vacuum cleaner in such a manner that it slides into the pushed-in position solely by virtue of gravitational force. The drawer-like pull-out then does not have to be actively pushed in

by the user, but automatically travels back into the moved-in operating position. In that case biasing means such as tension or compression springs for biasing the drawer-like pull-out into the moved-in operating position are also not necessary for automatic movement in of the drawer-like pull-out. Obviously biasing means can, if required, be present if for
5 constructional reasons the gravitational force is not sufficient in order to move in the drawer-like pull-out.

In a further embodiment of the invention the drawer-like pull-out is arranged in the housing of the vacuum cleaner above the motor/fan unit and/or a cable winding device. A compact
10 mode of construction for the vacuum cleaner is achieved by the arrangement of drawer-like pull-out and the further essential subassemblies of the vacuum cleaner one above the other. Preferably, the drawer-like pull-out extends substantially over the entire width or length of the vacuum cleaner in order to be able to make the drawer-like pull-out of the largest possible size so that a dust separator, which is received by the drawer-like pull-out, with a
15 large capacity can be used. In addition, the inclined arrangement of the drawer-like pull-out contributes to overall compact construction of the vacuum cleaner.

In a construction according to the invention the drawer-like pull-out has a front panel which in the closed position hermetically bears against the housing. Through the sealed bearing
20 against it is ensured that a sufficient underpressure can be generated in the dust chamber by the motor/fan unit. In principle it is sufficient if the front panel bears against an outer wall of the housing and a sealing coating is applied therebetween. By virtue of the underpressure produced by the motor/fan unit the drawer-like pull-out is, in particular, sucked in direction towards the housing and pressed against the sealing coating so that a
25 good sealing effect is achieved. For improvement of the sealing action there can, however, also be provided a sealing lip or sealing cord which is arranged either at the housing of the vacuum cleaner or at the drawer-like pull-out, preferably at the front panel, and hermetically closes off at a corresponding sealing surface.

A detent means can be provided between the drawer-like pull-out and the housing for holding the drawer-like pull-out in its closed position. Unintended outward movement of the drawer-like pull-out is prevented by the detent means. It would be disadvantageous, particularly during operation of the vacuum cleaner, if the drawer-like pull-out opens and
 5 frees the dust chamber. The underpressure in the dust chamber when then decay and the function of the vacuum cleaner would be disturbed. If the drawer-like pull-out should move out unintentionally during operation then the vacuum cleaner, particularly the pull-out, could be damaged if the user did not notice this and the pull-out hits against, for example, a piece of furniture during movement of the vacuum cleaner.

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Advantageously the vacuum cleaner can have an actuating element for unlocking the detent means. Thus, the drawer-like pull-out can be withdrawn only after the actuating element has been actuated by the user. This has the advantage that the drawer-like pull-out cannot be moved out unintentionally. The drawer-like pull-out is released only in the case of an
 15 express wish of the user. Due to the actuating element there is created, in particular, a functional feature of a vacuum cleaner which allows handling of the vacuum cleaner by the user in clear and satisfactory manner.

The drawer-like pull-out can have a hand grip for user-friendly and ergonomic handling of
 20 the vacuum cleaner. The drawer-like pull-out can be actuated by pulling at the handgrip. The actuating element can, in advantageous and ergonomic manner, be arranged at the handgrip or the handgrip itself can be movably mounted at the drawer-like pull-out and form the actuating element.

Preferably the vacuum cleaner has a resilient biasing element, against the spring force of which the drawer-like pull-out is held in closed setting. The biasing element is biased in the pushed-in, operationally ready position of the drawer-like pull-out. If locking at the drawer-like pull-out is triggered, then the drawer-like pull-out moves, preferably against
 25 gravitational force, into an open position in which the dust separator is removable from the
 30 drawer-like pull-out. Due to the resilient biasing element there is achieved an automatic

movement of the drawer-like pull-out which gives to the user an impression of particular quality.

In all described embodiments and variants of the invention the drawer-like pull-out can
 5 either be held at the housing in such a manner that the drawer-like pull-out cannot be
 completely removed from the vacuum cleaner or can be held in such a manner at the
 housing that it is removable from the housing. If the drawer-like pull-out is constructed to
 be removable from the housing then the advantage results that the dust separator can be
 removed from the vacuum cleaner together with the drawer-like pull-out. In that case the
 10 user is not obliged to grip the dust filter bag. It is sufficient to grip the drawer-like pull-out,
 particularly at the handgrip thereof, to remove it from the vacuum cleaner and to take it to a
 suitable location in order to dispose of the dust filter bag. A new, non-soiled dust filter bag
 can thereafter be inserted into the drawer-like pull-out and the pull-out together with the
 new dust filter bag inserted into the vacuum cleaner. Insertion of the new dust filter bag in
 15 that case does not have to take place in a body posture near the floor, but can be carried out
 standing or sitting. Only subsequently is the dust filter bag, which is inserted into the
 drawer-like pull-out, inserted into the vacuum cleaner. The vacuum cleaner is then
 operationally ready again.

20 The invention is described in more detail in the following on the basis of an example of
 embodiment, in which:

Figure 1 shows a perspective view of a vacuum cleaner according to the invention,
 with closed, drawer-like pull-out;

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Figure 2 shows a perspective view of the vacuum cleaner of Figure 1, with opened,
 drawer-like pull-out;

Figure 3 shows a cross-section through the vacuum cleaner according to Figure 2;
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Figure 4 shows a cross-section through the vacuum cleaner according to Figure 1.

A vacuum cleaner 1 having a housing 2 is illustrated in Figure 1. Two running rollers 3
5 arranged at opposite longitudinal sides of the housing 2 are rotatably mounted in the tail
region of the vacuum cleaner 1. A connecting stub pipe 4 arranged in the front region of
the vacuum cleaner 1 at the upper side thereof is fastened to the housing 2. A suction hose
5 connected with a suction nozzle (not illustrated) is connected with the connecting stub
pipe 4. A dust chamber 7 is disposed in the housing 2 above a fan chamber 6. A drawer-
10 like pull-out 8 is pushed into the dust chamber 7 from the rear side in the tail region of the
vacuum cleaner 1. The pull-out 8 has a front panel 9 which in the closed position of the
pull-out 8 closes an access opening 10 in the housing 2. The front panel 9 has a
semicircular profile, wherein the curved side of the front panel faces upwardly. The
straight side of the front panel 9 is directed downwardly and faces the fan chamber 6. A
15 handgrip 11 is integrally formed at the outer surface of the front panel 9. The outer surface,
which is covered by the handgrip 11, of the front panel 9 is of concave shape and forms a
grip trough 12.

Figure 2 shows the vacuum cleaner 1 of Figure 1 with withdrawn drawer-like pull-out 8.
20 The pull-out 8 has a boxlike plan. The side wall of the pull-out 8, which is flush with the
profile of the vacuum cleaner 1, has the front panel 9. The pull-out 8 has a planar base
surface, at which the front panel 9 - as one side wall - and the further side walls are
integrally formed. A curved support 14 spans from an upper edge of one longitudinal side
wall 13 to a longitudinal side, which is opposite the side wall 13 and not visible, of the
25 pull-out 8. A coupling member 15 is fastened to the curved support 14. An opening of a
dust filter bag 16 bears against the underside of the coupling member 15. The coupling
member 15 stands at the connecting stub pipe 14 in the closed position of the pull-out 8.

Figure 3 shows the vacuum cleaner of Figure 2 in cross-section. A sealing cord 17, which
30 in the closed position of the pull-out 8 bears against an edge 18 of the access opening 10 in

the dust chamber 7, is fastened to the side of the front panel 9 facing the vacuum cleaner 1. The pull-out 8 can be pushed into the vacuum chamber 7 along an inclined plane 19. The inclined plane 19 forms the base of the vacuum chamber 7 and at the same time the roof of the fan chamber 6. A suction opening 20 is formed in the base of the vacuum chamber 7.

5 The suction opening 20 is open towards the fan chamber 6. Arranged within the fan chamber 6 is a motor/fan unit 21 which is connected with the dust chamber 7 by way of the suction opening 20. A cable winding device 22 is arranged within the fan chamber 6. The cable winding device 22 contains a mains cable (not illustrated), the free end of which has a mains plug 23. A biasing element 24, which assists withdrawal of the pull-out 8 against the
10 slope of the inclined plane 19, is fastened to an inner wall of the vacuum chamber 7 in the front region of the vacuum cleaner 1.

The vacuum cleaner 1 with pushed-in pull-out 8 is shown in Figure 4. The biasing element 24 stores, in the illustrated position of the pull-out, energy for pushing-out of the pull-out 8
15 against the slope of the inclined plane 19. In order to keep the pull-out 8 in the pushed-in position notwithstanding the biased biasing element 24, an actuating element 25 is pivotably mounted at the housing 2. The actuating element 25 is pivotably mounted at the housing 2 in a centre region by means of an axle 26. The limb, which faces the tail region of the vacuum cleaner 1, of the actuating element 25 has a detent means constructed as a
20 hook. The detent means 27 engages, in the moved-in position of the pull-out 8, in a groove 28 at the front panel 9 and keeps the pull-out 8 in the moved-in position. Through pressing of the limb, which is opposite the detent means 27, of the actuating element 25 the hook of the detent means 27 is pivoted upwardly out of the groove 28 and the pull-out moves out with the bias of the biasing element 24 against the slope of the inclined plane 19.

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